Site Monitoring Report (SMR) Guidance

for Leaking Underground Storage Tanks (LUST) Sites
Using Risk-Based Corrective Action (RBCA)

Iowa Department of Natural Resources
Underground Storage Tank Section
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502 East Ninth Street
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Version 1.0 -- February, 1997

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INSTRUCTIONS

IMPORTANT: This document provides instructions for conducting site monitoring and preparing a Site Monitoring Report (SMR). Read all instructions before completing the form. The guidance documents for Tier 1 and Tier 2 should be referenced for acceptable sampling and assessment procedures. If a monitoring well which is a part of a monitoring plan cannot be sampled (i.e., the well is dry, cannot be found, is damaged, etc.), the well must be replaced unless adequate justification can be provided for substituting an existing monitoring well or explain why sampling at that location is no longer required. UST owners and operators eligible to receive state funds to cover site investigation expenses must submit the SMR preparation budget prior to initiating work at the site to GAB Robins, PO Box 3837, 2600 72nd Street, Suite A, Des Moines, IA 50322, 515/276-8046. Failure to receive budget approval from GAB Robins prior to starting work at the site may result in a loss of state benefit eligibility.

Types of monitoring

The SMR form includes tables to be used for the various types of monitoring (annual, remediation, exit, etc.); therefore, the groundwater professional should determine which tables are applicable for the type of monitoring required at the site.

Types of monitoring			
Type of monitoring	**Frequency**	**Quarter^**	**Required wells**
Bedrock: Non-granular	At least annually	3rd	All groundwater monitoring wells at the site
Bedrock: Granular	At least annually	3rd	Transition well and sentry well for each applicable receptor
High risk: Remediation	At least quarterly	1, 2, 3 & 4	Specific monitoring plan & schedule determined by cert. groundwater professional and as listed in CADR Quarterly monitoring with semi-annual SMR submittal
High risk: Interim	At least annually	3rd	Source well, transition well and guard well for each receptor and all wells which exceed a site-specific target level (SSTL) line
Low risk	At least annually	3rd	
Exit monitoring	At least annually*	3rd	
Pre-RBCA high or low risk monitoring	At least annually#	2nd	

Source well(s): monitoring well (s) [MW] at the maximum source concentration
Transition well: MW with detected levels of contamination closest to the leading edge of the groundwater plume as defined to the pathway-specific target level, and between the source(s) and the point(s) of exposure
Guard well: MW between the source(s) and the point(s) of exposure with concentrations below the SSTL line.
* Sampling events for exit monitoring must be separated by at least six months.
\# Follow the frequency listed on the General Monitoring Requirements page of the Monitoring Certificate issued by the department after the acceptance of the Site Cleanup Report or Corrective Action Design Report (CADR).
^ Recommended sampling quarter - if sampling will not occur in this quarter, or if sampling will occur more frequently, provide the quarter(s) in which the sampling will be performed in the monitoring plan

Bedrock / Non-granular monitoring: All monitoring wells at the site must be sampled at least annually. Re-evaluation of the potential for impact to actual receptors is required at sites designated as non-granular bedrock if concentrations from monitoring wells increase more than 20 percent of the previous samples. To meet **exit monitoring criteria at non-granular bedrock** sites, the contaminant concentrations from **all** groundwater monitoring wells must not exceed the applicable target levels for three consecutive sampling events.

Bedrock / Granular monitoring: A transition well and sentry well between the source and each receptor for groundwater ingestion and surface water pathways must be sampled at least annually. The transition well must have detectable levels of contamination and be located closest to the leading edge of the groundwater plume between the source and receptor. The sentry well must have concentrations below the applicable target level and be located between the source and receptor, outside the defined plume approximately 200 feet from the actual receptor. If the receptor is closer than 200 feet from the defined plume, the certified groundwater professional must provide an alternative placement for the sentry well, justification for its placement and obtain department approval. If the sentry well becomes impacted, active remediation must be initiated.

Exit monitoring at granular bedrock sites must be met in two ways:

1) the sentry well(s) between the source and receptor must not exceed applicable target levels for three consecutive sampling events, and sampling events must be separated by at least six months; and
2) the three most recent consecutive groundwater samples from the transition well(s) most show a steady or declining trend and meet the following criteria:
    a) the first of the three samples must be greater than detection limits,
    b) concentrations cannot increase more than 20 percent from the first of the three samples to the third sample,
    c) concentrations cannot increase more than 20 percent of the previous sample,
    d) and sampling events must be separated by at least six months.

High risk / Remediation monitoring: Remediation monitoring is performed during the operation of an **active** remediation system. The certified groundwater professional must provide a specific monitoring plan and schedule (at least quarterly monitoring with semi-annual reporting) for the site in the CADR. Remediation monitoring may include groundwater sampling, influent/effluent sampling, etc. A progress summary evaluating the remediation system must be included with the high risk remediation SMRs. The initial SMR submitted after the treatment system start-up must include a construction documentation section. Refer to the CADR guidance document for details regarding the progress summary and construction documentation sections.

High risk / Interim monitoring: Interim monitoring begins once a Tier 2 Site Cleanup Report is submitted and continues until the site is classified as No Action Required. A source well, transition well, and guard well for each receptor must be sampled at least annually.

Low risk monitoring: For sites classified as low risk, the purpose of monitoring is to determine if concentrations are decreasing such that reclassification to no action required may be appropriate or if concentrations are increasing above the site-specific target level line such that reclassification to high risk is necessary. Monitoring is necessary to evaluate impacts to actual receptors and assess the continued status of potential receptor conditions (check potential receptor areas for new actual receptors). A Best Management Practices Plan must be provided in the initial SMR.

Groundwater monitoring for potential receptors (i.e., groundwater ingestion and groundwater vapor to enclosed space pathways) is required at least annually at a source well, transition well and guard well between the source and a receptor. If the entire plume is considered a potential receptor, then a source, transition and guard are required at least in the downgradient direction. In addition to downgradient, any other properties (cross- or upgradient) which are inside the receptor plume must be evaluated. In this case, each of the sides of the property must be designated as a line receptor (refer to Figure 1). If the guard well is less than 50 feet from the source, no transition well is required.

The actual plume, instead of the simulated plume, may be used to designate potential receptor point of exposure areas if an institutional control is in use on the property of the source concentration **and** the following monitoring requirements are met:

- Monitoring is conducted at locations (down-, cross- and/or upgradient of the source) to evaluate property boundaries which are inside the simulated receptor plume.
- Monitoring shows a steady or declining trend (minimum of three samples separated by at least six months).

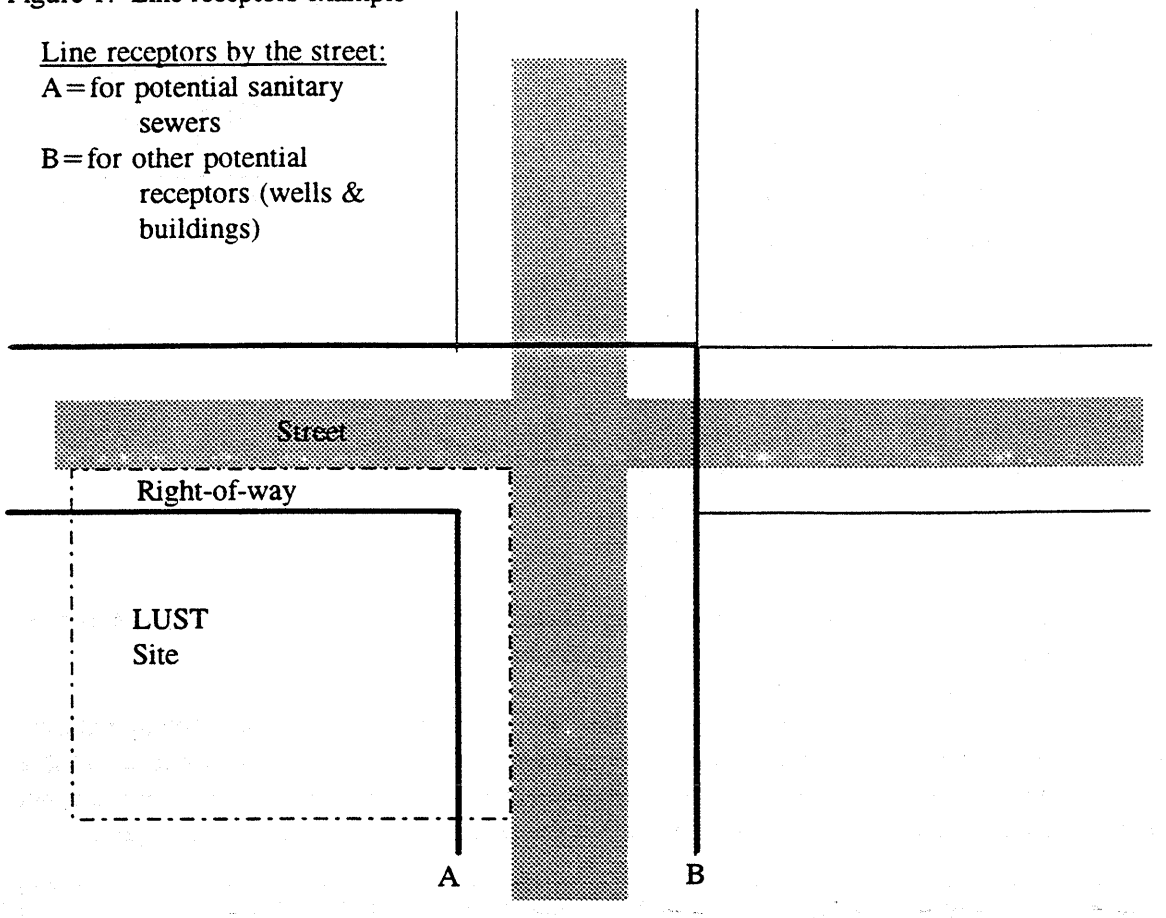
Although all monitoring wells which exceed the Tier 1 level will not be required to be monitored annually for potential receptors, they should be properly maintained for potential future monitoring in case they are needed to verify a request for no action required classification.

If a property boundary lies along a street:

a. For potential sanitary sewers, the line receptors would be the lines inside the public right-of-way (line A in Figure 1).

b. For other potential receptors, the line receptors would be the boundaries of adjacent properties, just past the public right-of-way (line B in Figure 1).

Figure 1. Line receptors example

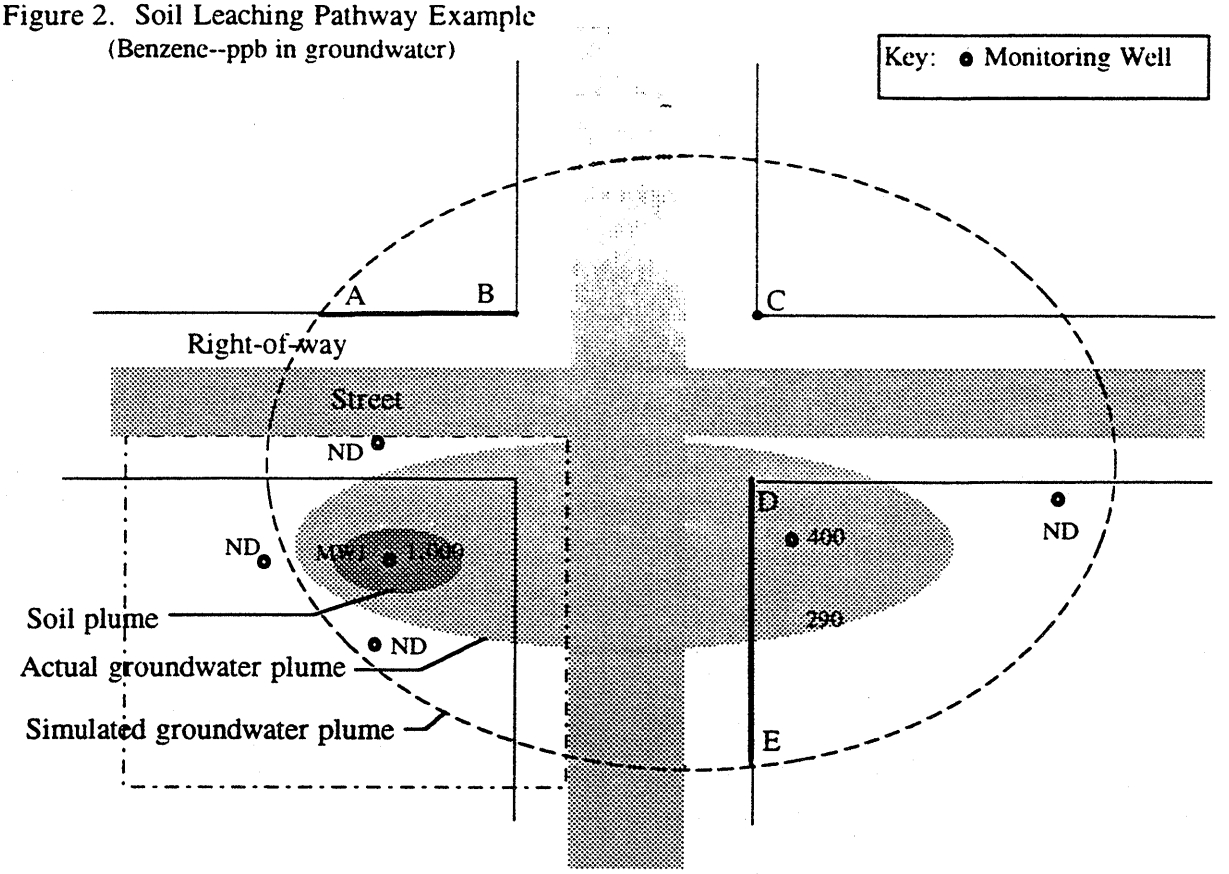


Note: If this creates a situation where there appears to be an excessive number of monitoring wells required to be monitored for the site, an alternative monitoring plan may be suggested along with justification for department approval.

Potential receptors for soil vapor to enclosed space: soil gas monitoring must be conducted at a minimum of once per year in area(s) of expected maximum vapor concentration where an institutional control is not in place.

For soil leaching to groundwater ingestion pathway potential receptors, annual groundwater monitoring is required for a minimum of three years as provided in 135.12(4)"c". If groundwater concentrations are below the applicable target level for all three years and a final soil sample taken from the source shows no significant vertical movement, no further action is required. If groundwater concentrations exceed the applicable target level in any of the three years, corrective action is required to reduce soil concentrations to below the target level for soil leaching to groundwater. Therefore, annual monitoring of soil is not applicable Target level refers to the Tier 1 level when there are no current or anticipated on-site institutional controls. Target level refers to the SSTL line if there is an on-site institutional control or if the property boundaries are being evaluated in anticipation of an on-site institutional control.

Figure 2. Soil Leaching Pathway Example
(Benzene--ppb in groundwater)



In Figure 2 above, the source for soil and groundwater is at MW1, with a soil concentration of 3.0 ppm benzene. The groundwater is protected and potential groundwater ingestion is the only receptor of concern.

If there are no institutional controls (current or anticipated), then the Tier 1 levels apply. The soil leaching pathway is considered high risk, and soil concentrations would need to be reduced to less than 0.54 ppm benzene. If it is possible to get an on-site institutional control, then the soil SSTL must be calculated for each receptor which is inside the receptor plume (which in this case is the simulated groundwater plume generated using the soil source data).

Receptor	Soil SSTL	Evaluation	Result for soil leaching pathway
Line AB	5.0	SSTL > Actual source concentration (3.0)	No institutional control needed for Property AB No further action for this receptor
Point C	4.6	SSTL > Actual source concentration (3.0)	No institutional control needed for Property C No further action for this receptor
Line DE	1.5	SSTL < Actual source concentration (3.0)	Soil leaching pathway is high risk for this receptor. Reduce soil concentrations to <1.5 OR Get an institutional control for Property DE

Exit monitoring: Exit monitoring criteria means the three most recent consecutive groundwater samples from all monitoring wells must show a steady or declining trend and the most recent samples are below the site-specific target level line. Other criteria include the following: the first of the three samples for the source well and transition well must be greater than detection limits; concentrations cannot increase more than 20 percent from the first of the three samples to the third sample; concentrations cannot increase more than 20 percent of the previous sample; and sampling events must be separated by at least six months.

Pre-RBCA high or low risk monitoring: Sites evaluated and classified as high or low risk under the previous rules which are currently conducting monitoring may continue the site monitoring specified in their monitoring certificate with the understanding the monitoring may not be compatible with RBCA monitoring principles. The sites also have the option to revise the monitoring plan to be more compatible with RBCA monitoring principles (i.e., monitor a source well, transition well and guard well for every receptor). The sampling for high or low risk monitoring sites should be performed during the second calendar quarter. Eventually, all these sites will be evaluated using RBCA.

Report preparation and submittal

A response must be provided for questions appropriate for the type of monitoring being conducted, unless directed otherwise in the instructions. However, please try to limit the response to the area provided. If an expanded response is required, reference it as an attachment.

Report submittal: A Site Monitoring Report (SMR) must be submitted to the department **within 30 days of the end of the calendar quarter in which the samples were collected.** (The only exception to this is with remediation monitoring. Remediation monitoring includes quarterly monitoring with semi-annual SMR submittals due by January 30 and July 30.) Sites with a RBCA analysis completed should be monitored annually during the third quarter of the calendar year (SMR due by October 30). Sites without a RBCA analysis completed should be sampled annually during the second quarter of the calendar year (SMR due by July 30). Reports not submitted in the format required by this document and subrule 567-135.12 of the Iowa Administrative Code or considered to be incomplete will be rejected. The monitoring certificate may be invalidated and the site reclassified to high risk if it is determined by the department that the owner of the site is not in compliance with the requirements specified in the monitoring certificate [135.12(10)a].

A blank copy of the SMR form is attached. The groundwater professional may complete the hard copy version of the SMR form or use the SMR form available as a Word for Windows document on disk which may be obtained from the IDNR Records Center by calling 515/242-5818. However, a hard copy of the SMR must be submitted to the department. Copies of administrative rules referenced in this document may also be obtained from IDNR Records Center.

The department anticipates revising the guidance documents in the near future. All Iowa certified groundwater professionals will be sent updates of the guidance documents as they become available. Other interested parties may obtain updated versions of the guidance documents by submitting a written request to the IDNR, LUST Coordinator at the address below. The written request must include the name and mailing address of the person making the request.

The completed SMR form must be accompanied by the maps and appendices listed in the "Requirements for Report Maps and Appendices" section at the end of this guidance. Title and number each appendix as listed in bold. Attach the appendices in the same order as listed. Ensure all maps are legible, have a north arrow, scale and legend. If possible, maps should either be prepared on 8½ x 11-inch paper or reduced to that size by a single fold, preferably with north at the top of the page.

Send one copy of the completed SMR to the Iowa Department of Natural Resources, LUST Coordinator, Wallace Building, Des Moines, IA 50319-0034 and, if the state UST Fund is being used, one copy to GAB Robins, PO Box 3837, 2600 72nd Street, Suite A, Des Moines, IA 50322.

Review process: Upon receipt of the SMR, the department may either conduct a cursory review of the report for completeness relying on the groundwater professional for accuracy and compliance with the department's rules, or conduct a more thorough review to determine whether the report is complete, accurate, and in compliance with the department's rules. Incomplete SMRs and SMRs not submitted in the format required by this document will be rejected.

Cover page: Fully complete the cover page of the SMR including signatures of the responsible party and certified groundwater professional. The street address is sufficient for site identification purposes. If a rural route, box number or street without a house number is used, then a legal description must be provided using the township, range, and ¼, ¼, ¼, ¼ section. If a no further action certificate is requested, an accurate legal description of the site, as found in the deed or mortgage, must be provided. The legal description may be submitted as an attachment if the space provided on the cover page is insufficient. Check the appropriate box describing the type of monitoring performed at the site. Also check the "Initial Monitoring" box if this is the first SMR submittal for the site.

Checklist page: Checklists have been included with the form to assist with report compilation. Choose the appropriate checklist for the type of monitoring required at the site. **Please place the attachments in the same order as listed on the checklist page. Check the boxes for those documents which have been attached. Information specific to the site will dictate whether some optional items must be included.** It is the responsibility of the groundwater professional to determine what site-specific information must be included to produce a complete report.

Elevation measurements: All elevations are to be reported as feet above sea level (ASL). Each must be referenced to a National Geodetic Datum permanent or monumented control point/benchmark. All ASL measurements taken at the site must be determined by a differential survey to the benchmark. Variations from this requirement must receive prior approval from IDNR. Ground surface elevations must be measured to the nearest 0.1 foot. Top of casing elevations and static water levels must be measured to the nearest 0.01 foot. An adequate number of water levels must be measured in each well to determine the static water level.

Receptor evaluation summary: Actual receptors must be evaluated at least annually to ensure no actual data is above the SSTL line for that receptor. Potential receptor areas of concern must be evaluated at least annually and the presence of no actual receptors confirmed. If actual receptors are present or reasonably expected to be brought into existence, the owner or operator must report this fact to the department as soon as practicable. Annual monitoring which also meets exit monitoring criteria under 135.12(6) may be used for that purpose.

The following receptors must be evaluated annually:

A.) All actual and potential receptors.

B.) If the concentrations of chemicals of concern are increasing or it appears the groundwater plume is migrating:

1.) A new receptor plume must be generated to determine additional receptors which must be evaluated if:

a.) the source concentration(s) increases

b.) concentrations in any of the monitoring wells required in the monitoring plan exceed the simulation value for that point (if it was not previously modeled at Tier 2).

2.) Evaluate any receptor which is within the new receptor plume (even if it was no further action required for the pathway at Tier 2);

Receptor summary tables: Receptors must be evaluated to ensure no actual data is above the site-specific target level line for that receptor. Complete the Receptor Summary for each receptor required to be evaluated.

- Record the name of each receptor in the appropriate pathway section, first column.
- Put an X in either the "A" box for an actual receptor or the "P" box for a potential receptor.
- In the "Last Risk H / L / N / New" column, label the last risk classification assigned for each receptor (e.g., in the previously submitted report). Use "H" for high risk, "L" for low risk, "N" for no action required, and "New" if it is a new receptor.
- In the "Risk: H / L / N" columns, label the current risk of the receptor for each chemical required to be monitored. Use "H" for high risk, "L" for low risk and "N" for no action required.
- Repeat for TEH diesel and waste oil if those chemicals were required to be analyzed.
- Determine if exit monitoring criteria have been met for the receptor and answer either yes "Y" or no "N" in the "Exit Mon. Met? Y / N" column.
- For "Corr. Action Taken? Y / N", indicate if corrective actions have been completed for the receptor since the last RBCA report submittal. Use "Y" for yes and "N" for no
- The last column, "Current Risk", should be used to describe the **current** risk classification for each receptor. Use "H" for high risk, "L" for low risk and "N" for no action required. See the following example (Table 1):

Table 1

RECEPTOR SUMMARY TABLE			Last Risk H/L/N/	Risk: H / L / N						Exit Mon.	Corr. Action	Current Risk
				Group 1				TEH		Met?	Taken?	
Receptor Name	A	P	New	B	T	E	X	D	W	Y/ N	Y / N	H/L/N
Groundwater Ingestion - Actual												
Private Well A	X		H	H	H	L	N	N	N	N	Y	H

Every receptor listed for any groundwater pathway must also be listed for the Soil Leaching to Groundwater pathway in the table on page 4 of the SMR form.

The rows provided under "Additional pathways" at the bottom of the table on page 4 may be used for receptors which may not fit on page 3; please label the pathway for these receptors. These pages may be copied as needed to accommodate all receptors.

Potential receptor summary table: Potential receptor areas of concern must be evaluated at least annually and the presence of no actual receptors confirmed. Evaluate all potential receptors within the applicable receptor plume area. If a Tier 2 SCR has not been completed, evaluate all potential receptors within the specified distance [listed after the question] from the source. Answer the questions as either yes or no (unknown is not an appropriate response). Provide the names of all people contacted, the company names and addresses, phone numbers and the dates of contact. For the first two questions, regarding new drinking and non-drinking water wells, the certified groundwater professionals only need to report well information from public entities (i.e., county health or zoning departments, IDNR, Water Supply Section, Geological Survey Bureau, & water well owners). Provide documentation if applicable (i.e., well plugging forms, utility maps, etc.) in Appendix 11. For those receptors which require an on-site survey (i.e., those dealing with buildings & surface water bodies), the name of the person performing the survey should be listed as the contact name. If actual receptors are present or reasonably expected to be brought into existence, the owner or operator must report this fact to the department as soon as practicable. See the following example (Table 2):

Table 2

Potential receptor summary				
Receptor questions	Yes / No	Contact Name/Company Name/ Complete Address	Contact Phone #	Date
New drinking water well(s)? [1,000']	Yes	1. Jean Prior, IDNR, Geological Survey Bureau, 109 Trowbridge Hall, Iowa City, IA 52242-1319	(319) 335-1583	01/01/97
		2. name of contact at county health or zoning departments, street, city, IA zip code	(515) 555-1212	01/10/97
		3. name of contact at IDNR Water Supply section, street, city, IA zip code	(515) 281-7814	01/09/97
		4. name of contact - water well owners, street, city, IA zip code	(712) 555-1313	01/06/97
New surface water body(ies)? [200']	No	John Smith, Smith Consulting Co., 123 Main St., Hometown, IA 55555	(111) 555-1111	01/02/97

Receptors: status change: List and describe all receptors whose status has changed since the previous receptor evaluation (e.g., Private Well A was plugged, a new housing development was built adjacent to the property, etc.).

Reclassification: Any site or pathway which is classified as high risk may be reclassified to low risk if in the course of corrective action the criteria for low risk classification are established. Any site or pathway which is classified as low risk may be reclassified to high risk if in the course of monitoring the conditions for high risk classification are identified. Sites subject to department-approved institutional or technological controls are classified as no action required if all other criteria for no action required classification are satisfied.

A **no action required** site classification may be proposed if all the criteria for pathway clearance have been met for every pathway. Note, however, all corrective actions necessary to satisfy the criteria for pathway clearance must be conducted prior to submittal of an SMR which requests such a site classification. All corrective action supporting documentation must be submitted as attachments to the SMR, if not submitted previously. Documentation may include any of the following:

- Proof of institutional controls (copies of deed restrictions, declaration of restrictive covenants, etc.)
- Copies of notices to the IDNR Water Supply Section
- Copies of notices to county authorities which issue private water supply construction permits
- Report of soil excavation activities
- Report of plastic water line replacement or relocation
- Copies of notices to utility companies which supply water to the area of concern
- Copies of notices to authorities responsible for sanitary sewer construction

Please mark whether the site should be reclassified. If yes, mark the current site classification. Provide justification for the reclassification. If a No Action Required site classification is being proposed, all corrective actions and any applicable confirmation sampling or exit monitoring must be completed and summarized here. Provide all necessary documentation in Appendix 11.

Groundwater monitoring summary tables: Complete the table and include data from all dates a monitoring well was sampled, not just the last three events.

"Boring/MW #": list all monitoring wells which are required to be sampled.
"Type": type of monitoring well, using the following abbreviations:

"S" for source well
"T" for transition well
"G" for guard well
"Sen" for sentry well
"X" for well which simply exceeds the SSTL line value for that point
"R" for receptor when the sentry well has been impacted or the receptor when the concentration at the point of exposure already exceeds the SSTL line
"P" for primary area well which exceeds the smallest applicable source SSTL for the site

"Top of Screen": expressed as feet above sea level measured to the nearest 0.1 foot.
"SWL": static water level, also expressed as feet above sea level measured to the nearest 0.01 foot, at the time of each sampling event. List the results of the sampling events in chronological order (oldest first).
"Sampling date": the date for each sample
For each chemical analyzed provide the following:
"Actual Concentration": Actual concentration in parts per billion (ppb). Please highlight or make the numbers bold for actual concentrations which exceed the lowest SSTL value.
"Lowest SSTL": For each monitoring well required to be monitored, list its lowest SSTL line value (in ppb).
"Receptor": For each monitoring well required to be monitored, list the receptor which corresponds to its lowest SSTL line value.

See example Table 3 below (site stored only gasoline):

Table 3

Groundwater monitoring summary

Boring/MW #		MW-7	MW-7	MW-7	MW-18	MW-18	MW-18
Type		S	S	S	T	T	T
Top of screen (ASL)		1022.8	1022.8	1022.8	1018.9	1018.9	1018.9
Static water level (ASL)		1013.58	1013.56	1014.76	1015.16	1013.86	1015.10
Sample date		10/24/94	5/9/96	11/1/96	10/23/95	5/9/96	12/2/96
B	Actual concentration	**24400**	**16000**	**21900**	**1560**	86	**504**
	Lowest SSTL	113	113	113	420	420	420
	Receptor	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1
T	Actual concentration	**29800**	**22000**	**30000**	**13200**	**5700**	**6790**
	Lowest SSTL	347	347	347	789	789	789
	Receptor	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1
E	Actual concentration	2530	3000	2640	2340	1500	2150
	Lowest SSTL	3041	3041	3041	3350	3350	3350
	Receptor	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1
X	Actual concentration	12200	14000	14300	11800	7200	10200
	Lowest SSTL	16822	16822	16822	19670	19670	19670
	Receptor	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1	DWW-1
D	Actual concentration						
	Lowest SSTL						
	Receptor						
WO	Actual concentration						
	Lowest SSTL						
	Receptor						

Remediation monitoring summary: Remediation monitoring during operation of a remediation system is required at least four times each year to evaluate the effectiveness of the system. A remediation monitoring schedule and plan must be specified in the corrective action design report and approved by the department. Complete one "Remediation Monitoring" table per monitoring point (i.e., monitoring well, influent, effluent, etc.) with all applicable monitoring information gathered at the site. Tabulate the analytical data chronologically. Provide the sampling point identifier (i.e., influent, effluent, monitoring well, etc.); top of screen (TOS) elevation in feet above sea level measured to the nearest 0.1 foot; static water level (SWL) elevation in feet above sea level measured to the nearest 0.01 foot; type of well; sampling dates; and parameters to be sampled. Parameters in italics (and not bold) may not be required by every technology. Provide the analytical results in the appropriate column. Some parameters listed in the table may not be applicable for the chosen technology and, therefore, do not need to be filled in. The blank lines are for parameters not listed in the table but are required to be monitored at the site. (See example Table 4 below.) A progress summary should be included with the remediation monitoring reports. The progress summary should include, at a minimum, the following:

- Detailed evaluation of analytical data. Evaluate the effectiveness of the treatment system (i.e., Discuss how the cleanup is progressing - is the treatment system producing the desired results and completing the objectives outlined in the "Timetable and critical performance benchmarks" section of the CADR?).
- Chronological monthly tabulation of gallons of treated water discharged, if the remediation system will discharge treated water. See example Table 5 below.

Table 4

Remediation monitoring				
Sampling Point: MW3	**TOS (ASL): 1239.75**		**Type of well: S, P**	
	Sampling Date 01-12-96	**Sampling Date** 07-16-96	**Sampling Date** 01-17-97	**Sampling Date**
Parameter(s) to be sampled	**SWL (ASL)** 1234.56	**SWL (ASL)** 1235.94	**SWL (ASL)** 1233.47	**SWL (ASL)**
Groundwater (ppb)				
Benzene	13,687	13,443	12,879	
Toluene	9,645	9,894	8,589	
Ethylbenzene	15,999	16,243	14,909	
Xylenes	22,754	21,222	20,741	
TEH - Diesel	N/A	N/A	N/A	
TEH - Waste Oil	N/A	N/A	N/A	
pH	7	7	7	

Table 5

Example gallons of treated water discharged					
month/year	gallons	month/year	gallons	month/year	gallons
- 01/97	500				

Groundwater analytical data table: This table should be used for Pre-RBCA high or low risk monitoring. Provide the boring or monitoring well number, ground surface elevation and top of screen (TOS) elevation in feet above sea level measured to the nearest 0.1 foot; static water level (SWL) elevation in feet above sea level measured to the nearest 0.01 foot; analytical data in the appropriate column; and type of well if the monitoring plan has been changed to be more in line with RBCA principles. If the original monitoring plan is followed, the type of well column does not need to be filled in. See example Table 6 below:

Table 6

Groundwater analytical data -- Pre-RBCA monitoring only											
Boring/ Well #	Date Sampled	Elevations (ASL)			Group 1				TEH		Type-S T/G/Sen
		Ground	TOS	SWL	B	T	E	X	D	W	
MW-A	12/12/96	1234.5	1234.5	1228.00	99,999	99,999	99,999	99,999	99,999	99,999	Sen

Sampling results for soil and soil gas: Complete these tables with all soil and soil gas results from sampling conducted since the submittal of the Tier 2 Site Cleanup Report (or Tier 3 Report). Complete the tables with the boring, monitoring or vapor sample identification number; sampling date; ground surface elevation in feet above sea level (ASL) measured to the nearest 0.1 foot; sample depth elevation in feet ASL measured to the nearest 0.1 foot; static water level elevation (SWL) in feet ASL measured to the nearest 0.01 foot; analytical data. Analytical results for soil samples should be expressed in mg/kg. Analytical results for soil gas should be expressed in ug/m^3.

Requirements for report maps and appendices

Attach the following appendices to the end of the Site Monitoring Report form in the order listed. Title each appendix consistent with the bold print below.

1. Site plan map. Provide a scaled map (scaled 1 inch = 20 to 50 feet) of the site and the immediate surrounding area. It must show, but is not limited to the following: location and content of existing and removed USTs, product lines and dispensers; pertinent site features (i.e., buildings, property boundaries, roads, wells, waterways, sinkholes, etc.); location of subsurface utilities, and any evaluated receptors. Label the street names.

2. Site vicinity map. Provide a scaled (scale 1 inch = 200 to 500 feet) vicinity map showing the site in relation to surrounding general features. It must show, but is not limited to the following pertinent general features: roads, waterways, sinkholes, **property boundaries**, existing structures such as schools, hospitals, child care facilities and other buildings, as well as any receptor not identified on the Site Plan Map. It must also show which areas are zoned for residential use.

3. Soil summary corrective action / soil gas contamination maps. Provide copies of the soil summary corrective action or soil gas contamination maps submitted with the Tier 2 Site Cleanup Report (SCR). If soil or soil gas samples were collected since the submittal of the SCR or Tier 2 SCR, label the sample locations and indicate the analytical results.

4. Groundwater summary corrective action maps. Provide copies of the groundwater summary corrective action maps from the Tier 2 SCR and a map showing the current contaminant levels for the wells sampled. If additional wells were installed and sampled since the last report submittal, label the wells and indicate the analytical results.

5. Groundwater flow direction map. Provide a groundwater flow map using the most recent static water levels at the site. Indicate the groundwater flow direction with an arrow. Groundwater contours and elevations at each data point used for contouring must be labeled on the map. Contours must be consistent with observed water elevations.

6. Laboratory data sheets. Provide copies of all laboratory data sheets including those for soil gas sample analyses and indoor vapor sample analyses, if applicable. Provide copies of all Chain of Custody forms. The laboratory analytical report must state whether the sample tested matches the laboratory standard for waste oil, diesel or gasoline or that the sample cannot be reliably matched with any of these standards. **Laboratory data sheets which have been previously submitted to the department do not need to be included in this appendix.**

7. Evaluation of analytical data. Provide a comprehensive evaluation of the most recent sampling data. Discuss if reclassification for the site is appropriate.

8. Best management practices plan. Provide a best management practices plan in the initial SMR. The plan must include maintenance procedures, schedule of activities, prohibition of practices, and other management practices, or a combination thereof, which, after problem assessment, are determined to be the most effective means of monitoring and preventing additional contamination of the groundwater and soil. The plan must also include a monitoring proposal containing sufficient sampling points to ensure the detection of any significant movement of or increase in contaminant concentration.

9. Monitoring plan from the Tier 2 SCR. Provide all required monitoring plans from the Tier 2 SCR in the initial SMR.

10. Tank and line tightness test results. If tank and line tightness testing has been conducted since the submittal of the Tier 2 SCR, attach copies of the latest tank system tightness test results and supporting field data and provide a description of the leak detection method and a summary of results for the most recent quarter. Although a summary is preferable, copies of leak detection results for the most recent quarter may also be submitted as supporting documentation of the integrity of the tank system.

11. Documentation. If applicable. Refer to Reclassification section on page 10.

12. Soil boring logs / Monitoring well construction diagrams. If additional borings / monitoring wells have been placed at the site since the submittal of the previous report, complete and attach DNR Form 542-1392 for each boring/monitoring well. **Soil boring logs / monitoring well construction diagrams which have been previously submitted to the department do not need to be included in this appendix.**